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California Forest Experiment Station

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Erosion Control

Technical Note

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Willow Cuttings For Erosion Control

by

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A quick and effective means of securing a vegetative cover for the control of soil erosion is the planting of willow cuttings. It is well known that most willows, poplars and cottonwoods will grow readily from cuttings when these are set in rich moist soil, as in streamsides and wet meadows. What is not so well known is that several species of willow will grow from cuttings in much less favorable soils such as new road fills and the gullies in bare denuded land. Even in very unfavorable sites willow cuttings will often grow vigorously for a few years before they die out. In the meantime they will have served the important function of stabilizing the soil and so enabling other plants to become started.

When willows are once established on favorable sites they may continue in possession of the ground to the exclusion of other vegetation. This possibility should be considered before willows are planted in such places. If, for example, willow cuttings are used to control gullies in range meadows, good management would dictate the use of only such species as are browsed by stock, thus obtaining an added improvement of the range in case the planting spreads and becomes permanent.

Uses. The uses of willow cuttings in erosion control, either alone or in combination with other materials, are numerous. A few examples are:

1. Control of actively cutting gullies in range meadows;
2. Reinforcement and protection of small dams at the ends and sides, upstream and down, and at spillways;
3. Protection of stream-banks which are being cut by high water;
4. Protection of bridge abutments and the toes of road and railroad fills which reach flowing water;
5. Fixation of new road fills of fine shifting material.

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In the construction of stake-and-brush dams for gully control in meadows, willow cuttings of large size can be used for stakes and posts in place of non-sprouting species which decay rapidly and do not grow. In the fixation and revegetation of new road slopes, the use of willow stakes to hold down the packed wattles of brush or straw in contour trenches results in a quick and secure living control of the soil independent of the slower growth of any seed which may be sown at the same time.

Species. The best advice that can be given is to use native species and to select those which appear best adapted to each intended use. Large post sizes can of course be obtained only from arborescent species, and since these usually grow in wet places too much can not be expected of their use in drier sites. For road-slope work the shrubby mountain and dry-arroyo types will usually give best results, and for this use the small-diameter stems of these species are also well suited.

Time to plant. Work done by the California Forest Experiment Station has shown a surprising degree and uniformity of success in the growth of various species, including streamside willows, when planted as dormant cuttings in the autumn and early spring on fill slopes of mountain roads. Such slopes are generally regarded as being severe planting sites. The explanation of this success lies in the absence of competing vegetation and in the deep planting of the cuttings, which together assure to the new roots exclusive use of all the moisture available in the soil below the dry surface layer.

The planting of cuttings after the start of spring growth, or throughout the summer, is not recommended, but even such planting may yield satisfactory results if restricted to favorable moist sites. It can not be expected to succeed in dry hillside work except, possibly, where summer rains occur or where the expense of watering can be resorted to. In such plantings not more than one or two sprouts should be permitted to grow per cutting, the others being removed as they appear. The cost of such detailed attention, however, practically rules summer planting out of consideration. More information is needed on this point, and field men are urged to try various methods of summer planting under careful observation and report their results to the Experiment Station.

Precautions. In preparing and planting willow cuttings the following precautions will increase the chances for success:

a. Cuttings of small diameter should be at least 18 inches long, and larger sizes can be any desired length beyond that, up to 8 or 10 feet for post sizes.

b. Cuttings up to $1\frac{1}{2}$ inches diameter can be cut most rapidly with two-handled pruning shears. The shears are operated by one man while another holds the willow stem and advances it the proper length for each cut. A sharp machete in the hands of an expert is a quicker method, though somewhat dangerous.

Larger diameters should be cut with sharp axes. Butt ends should be pointed to facilitate driving; this does not affect rooting ability. Beveling the tops slightly reduces the chances of splitting, but this refinement can be dispensed with if care is used in driving.

c. Set cuttings deep, the deeper the better up to two-thirds their length. Shallow planting results in too few roots below ground, too many leaf shoots above ground, and early death to the cutting, because the scanty roots can not supply water rapidly enough for the greater mass of foliage.

d. Make sure the cuttings are right side up, i. e. with butt ends in the ground. Since it is not always easy to tell the top from the butt of a leafless cutting a good rule is to tie cuttings in bundles at the time they are first made, keeping the top ends together and marking that end of the bundle.

e. Prepare holes with a crowbar for small-sized cuttings, or with a spade or post-hole digger for post sizes. This is to prevent stripping the bark in driving. Roots start from points in the inner bark; loosening of the bark from the wood destroys this root-sprouting ability.

f. Where stakes or posts can safely be driven, as in soft moist earth, it is advisable to use a wooden maul, of a size adequate to the size of stakes, to prevent splitting the stakes. Axes and sledges for driving are especially damaging to stakes of large diameter.

For setting large willow posts a good method is to start the holes with a spade, then drive the posts to a firm set with an improvised two-man pile-driver. This is simply a short section of log designed to be lifted and dropped endwise on the post by two men standing a-straddle on sawhorses of convenient height. Branch-stubs left on the log, cleats nailed on the sides, or drift pins, will serve as handles on the driver.

In short, the purpose of all these precautions is simply to avoid needless bruising and crushing of the soft growing tissues of the willow and to insure proper contact of the cuttings with the soil. The reward will be a higher percentage of successful "sets" and faster, stronger growth of those which do take root.